T18/B14/FRG1/94

IEA SOLAR HEATING AND COOLING PROGRAMME

TASK 18

ADVANCED GLAZING
AND
ASSOCIATED MATERIALS FOR SOLAR AND BUILDING APPLICATIONS

B14 Measurements of U-value

Measurements of Reference samples

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Introduction

The following Styrofoam reference sample was measured in our hot-plate facility for different temperature levels. The sample was the sample Nr.32 sent by TNO-TPD/NL to the participant. The thickness of the sample was 20mm. The size was 500mm x 500mm./1/

The hot plate device has two copperplates cooled respectively heated with water thermostats. The plate area is 400mm x 400mm. The heat flux measurements are being done with heat flux meters (3mm thickness) on both plates. The temperatures are being measured at the copper plates and corrected with the measured heat flow and a knwon sheet resistance in order to obtain surface temperatures. The instrument has already been used within the IEA Task 10 Subtask C and has been compared there favorably to other hot-plate apparatus of participating countries /2/.

Measurements

The following results have been obtained by extrapolating linearly to a mean temperature Tm=10°C. The temperature difference was about 16K in every measurement.

Sample	λ_{eff} [W/mK] *)	$\Lambda_{10°C}$ [W/m^{2}K]	$U_{10°C}$ [W/m^{2}K]
TNO-TPD Nr. 32 (NT5501)	0.032 ± 0.003	1.61 ± 0.04	1.27 ± 0.03

The U-value includes the standard surface coefficients h_i=8 W/(m^{2}K) and h_e=23 W/(m^{2}K), whereas the heat conductance Λ is the value measured directly in the hot-plate apparatus (inverse resistance).

The following graphics shows the temperature-dependent result of the thermal conductance Λ.

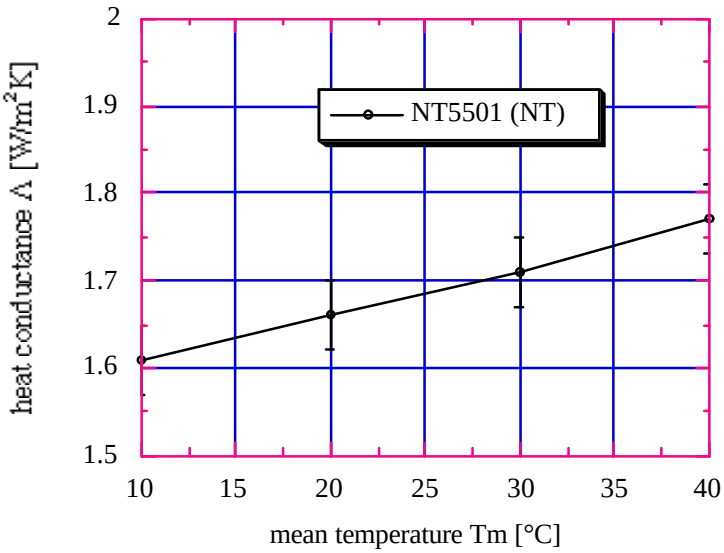

Fig.1: 3 measurements of heat conductance with extrapolation to T_m=10°C
Styrofoam-reference sample Nr. 32 (NT-hot-plate-apparatus)

Literature

/1/ W. Platzer, Meßbericht ISER-9312-WJP-I16
"Messungen für IEA Task 18 im TWD-Labor" (1993)

/2/ W. Platzer, "Interlaboratory testing of transparent insulation materials", Working document IEA Task 10, Subtask C (1991)